

## South Eastern Europe Cooperation in the Field of Modeling and Simulation

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### ABSTRACT

*In this paper we present an overview of our regional cooperation in the field of modeling and simulation. The use of modelling and simulation is a flexible and a cost-effective tool for improvement of military education, training, exercising and defense planning. It also promotes interoperability with NATO. We are a member of the South Eastern Defense Ministerial (SEDM initiative – Albania, Bulgaria, Croatia, Greece, Italy, Macedonia, Romania, Slovenia, Turkey) and we participate in all regional conferences and exercises in the field of civil-military emergency planning, like CMEP Workshops and SEESIM exercise. Most of these events are concerned with mutual cooperation and giving assistance in case of natural disasters (earthquakes, floods, fires etc.). They are Computer Aided Exercises (CAX), which use Internet and GIS technology as their bases. Our Military Academy has intensive bilateral cooperation with all regional countries. On these bases we have organized the First Symposium for Military Technology, which was held in Ohrid, Republic of Macedonia, on 25-28 September 2002. Some of the topics during the Symposium were closely connected with the field of modeling and simulations.*

**Keywords:** Modeling and Simulation, Cooperation in South-Eastern Europe, Computer Aided Exercise.

### SECURITY CONTEXT IN SOUTH EASTERN EUROPE

Countries in the South Eastern Europe (SEE) have to face a wide range of difficulties that are always associated with transitional periods. For these reasons the South Eastern European nations were aware that they must be prepared to commit themselves to far-reaching political, security, economic and social reconstruction.

The logic of the stabilization of the South East Europe requires a complex approach for achieving lasting peace, stability and security in the region. There is no doubt that the way out of the entire situation is exclusively through political, economic and security cooperation. The promotion of transparency and mutual confidence in defence and security related issues are between the key tracks that lay at the basis of the regional military cooperation and partnership for peace.

Against this background, the Defense Ministers of nine South Eastern European countries and the US initiated the Southeast European Defense Ministerial (SEDM) process which aims to contribute to regional security and stability and enhance regional cooperation. The SEDM process brings together, under the same umbrella, NATO countries as well as Partnership for Peace nations. This initiative provides a valuable political and military framework, enhances regional cooperation, shapes mentality and promotes cooperation between countries that have common security goals.

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<sup>1</sup> Turkey recognises the Republic of Macedonia with its constitutional name.

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SEDM gives a new dimension to defense diplomacy enforced by its military component that is the South East European Brigade (SEEBRIG), the first success story, as we like to call it, a truly multinational regional force in South Eastern Europe.

The multitude of South Eastern Europe initiatives proves that this part of the world is determined to work according to the principle of regional ownership, to closely cooperate with Euro-Atlantic structures and to further develop regional security capabilities. A closer co-operation between SEDM and NATO's South Eastern Europe Initiative is needed.

Among the main objectives there are capitalizing bilaterally and multilaterally gained experience in different fields, such as improvement of military education and training, increasing public awareness regarding fight against terrorism and exploring new cooperation opportunities with other international organizations (NATO, EU, OSCE etc.).

Countries from the South Eastern Europe region that cooperate in the Euro-Atlantic format make significant and systematic efforts to accomplish real progress in interoperability, implementation of an effective democratic oversight of military activities and full modernization of the existing system of military education and training. There is shared understanding that success in the coming years will depend to a great extent on the reform in the way of teaching and training military professionals.

Education and training are the shortest way to new military professionalism, interoperability and integration. The transparent cooperation in defence education and research can contribute to mutual confidence across the region.

Long-range vision of NATO Partnership for Peace is to create distributed environment in which all nations, including their universities and academies, have an equal opportunity to use, develop, deliver, and manage different kind of training and learning tools. Among these is modeling and simulation as a tool for improvement of military education and training. All these efforts are designed to harmonize and greatly enhance military and defence related education and training at all levels.

Common training would help nations to capitalise accumulated experience in addressing new security risks. At the same time, it could be an incentive to identify common approach and common course of action in coping with new security challenges. Moreover, it could result in improving or alleviating identified shortfalls in military and non-military capabilities that are required in the fight against terrorism. Making use of NATO/PfP appropriate models could be envisaged, in full compliance with the main objectives of the concept document.

In the next few years we expect revolutionary changes in security and defence related studies and military education and training. Distance learning, together with modelling and simulations, will change the way armed forces are trained. Increasing global competition, rapid technological advances, demographic changes, and the emergence of a service and knowledge-based economy impel military organisations to train and re-train their force in a new paradigm. Only these academies and training centers that deploy and effectively utilize modeling and simulations and Advanced Distributed Learning (ADL) will have a distinct competitive advantage.

## **IMPLEMENTATION OF MODELING AND SIMULATION IN THE MILITARY EDUCATION AND TRAINING PROMOTE INTEROPERABILITY WITH NATO**

The use of modelling and simulation is a flexible and a cost-effective tool for improvement of the military education, training, exercising and defense planning. Simulations could cover various aspects of military operations and they are valuable tools for staff training and After Action Review (AAR). The new

generation of multisided, interactive simulations allow fast, cost-effective planning, evaluation, and training for almost any situation that involves multiple persons or agencies working together for a common goal. Simulations can assist with resource allocation and scheduling, coordination in and between units, management decision making, procurement planning, and tactics.

The simulation of combat, or a wargame, is used more and more extensively to reduce cost and maintain a trained force. It is an inexpensive alternative to live training exercises. Simulations are also very useful for testing and evaluating proposed procedure strategies and various systems such as economics, weapons, communications and civil architecture.

As the military moves into non-traditional missions such as large scale evacuations, peacekeeping, and famine relief, simulations help to train military leaders without large investment. These simulation programs are not intended to train individual soldiers or other participants in conflict; rather, they train mission leaders. By participating in different scenarios, leaders learn how to respond to a wide variety of situations. For military training, simulations are particularly useful now because military organizations can afford fewer training hours and smaller expenditures during field exercises. This is especially problem for smaller countries with restricted budgets, and this mean that they mast regionally cooperate in this field.

Because of severe constraints in time, money, personnel and access to units and terrain, a need for simulations defined as “replication of reality as much as possible with models used in a game-engine (computer)” is imminent in order to enhance the ability to conduct operations. This is for most, if not all states, true, both on national and international basis.

Interoperability towards NATO standards for conducting Combined Military Operations and Operations Other Than War (like Peace Support Operations), require basic education, training and exercising based on common procedures and standards. Using modelling and simulation for conducting Computer Aided Exercises in which those standards and procedures are incorporated can significantly improve training of the multinational staff ant its ability to conduct joint and combined operations.

Modelling and simulation can provide readily available, flexible and cost-effective means to enhance NATO operations dramatically in the application areas of defense planning, training, exercises, support operations, research, technology development and armament acquisition. This vision assigns a very important role to modeling and simulation and must be supported from all countries that want to be interoperable with NATO. Computer Aided Exercises will further become more and more common in all multinational training activities organized by NATO. This means that implementing modelling and simulations in military education and training will help every NATO aspirant country to make the necessary progress in the preparation for NATO integration.

Taking into consideration that the base for a successful cooperation among partner nations is interoperability, establishment of PfP the Training and Education Enhancement Program (TEEP) provides advice on interoperability and identifies the requirements for Advanced Distributed Learning and simulation. Military advice on essential areas of interoperability for Partners has been introduced and reflected in PfP Planning and Review Process (PARP) ministerial guidance. These essential areas include:

- The ability to communicate effectively (to include language, procedures, and terminology);
- Command and control arrangements;
- Understanding of Alliance’s military doctrine, standards, and procedures.

Clearly, Partner interoperability with NATO can be facilitated through language training and training of NATO concepts, doctrines, and procedures. But, using modelling and simulation to conduct Computer Aided Exercises in which the operational language is one of the NATO official languages – English, and in which those standards and procedures are incorporated can significantly improve interoperability.

With the combination of ADL and the implementation of modelling and simulations through conducting Computer Aided Exercises the following can be advanced:

- General knowledge of NATO operational language;
- Basic knowledge of the generic NATO working environment, for example, the internal structure of the Land Forces headquarters from G1 to G6; map symbology; or legal arrangements for participation in collective defense systems;
- Specialized language terminology, for example, basic words, acronyms, and mission specific expressions such as those used for mine clearing or close air support;
- Knowledge and practice of NATO staff procedures, for example, exercise planning, air defense procedures, medical C 2 procedures, etc.

The role of Advanced Distributed Learning in the process of better implementation of modeling and simulations in education and training can be seen in the following:

- Learning different contents (different kind of Education courses) through courses that are available at home, and that mean cost effectiveness;
- Providing Training courses at the individual, collective, operational and strategic levels, the sort of teaching material that are needed to digest before exercising with Computer Aided Exercises or practicing an exercise with distributed simulations;
- Learning about the organization, structure and scenario of the Computer Aided Exercises.

To have better interoperability with NATO Partner nations will need support to establish and improve infrastructures and capabilities for Modeling and Simulations (M&S) and Advanced Distributed learning (ADL) in order to provide education and national training, and also capability to take part in NATO/PfP training/exercises. In this context, regional cooperation in the field of modeling and simulations is very important.

### SEESIM EXERCISE

The SEESIM Experts' Group was established to implement the SEESIM initiative approved by ten Defense Ministers (of Albania, Bulgaria, Croatia, Greece, Italy, Macedonia, Romania, Slovenia, Turkey, and the United States) during the October 2000 meeting of the South Eastern Europe Defense Ministerial (SEDM) process.

SEESIM was designed as a tool to integrate – through a series of simulation-based exercises – various initiatives and information networks in the region sponsored, supported, or endorsed by SEDM. These include, for example, the Multinational Peace Force, South Eastern Europe (MPFSEE or the SEE Brigade – SEEBRIG), the Engineer Task Force (ETF), PIMS, and the emerging Civil-Military Emergency Planning Council for South Eastern Europe.

The first SEESIM event will be a demonstration and exercise hosted by Greece in 2002. These will be based on a civil disaster scenario caused by severe, simultaneous earthquakes in several countries of the region. Civil protection bodies will therefore play a major role in simulations designed, among other things, to strengthen military support for civil authorities during civil emergencies.

The SEESIM Experts' Group held its first meeting in Athens, Greece, 12-13 December 2000 and developed Terms of Reference (TOR) for its work. It is co-chaired by Greece and the United States. The TOR established three bodies within the SEESIM Experts' Group: Steering, Technical, and Operational group.

Each SEDM nation has one military representative on the SEESIM Steering Group, which provides policy guidance to the subordinate Technical and Operational Working Groups. The Technical Working Group defines the technical requirements, network standards and architecture, and communications resources necessary to support the demonstration and exercise in 2002. The Operational Working Group develops the scenario and training objectives, defines the training audience, and addresses the coordination necessary to successfully conduct the demonstration and exercise.



Since the scenario for 2002 is based on a civil emergency, one civil protection and one military representative from each SEDM nation sit on the SEESIM Technical Working Group, and one civil protection and one military representative on the SEESIM Operational Working Group. In addition, the current head of the Civil-Military Emergency Planning Council for South Eastern Europe was designated co-chair – together with the SEEBRIG Commander or his representative – of the SEESIM Operational Working Group.

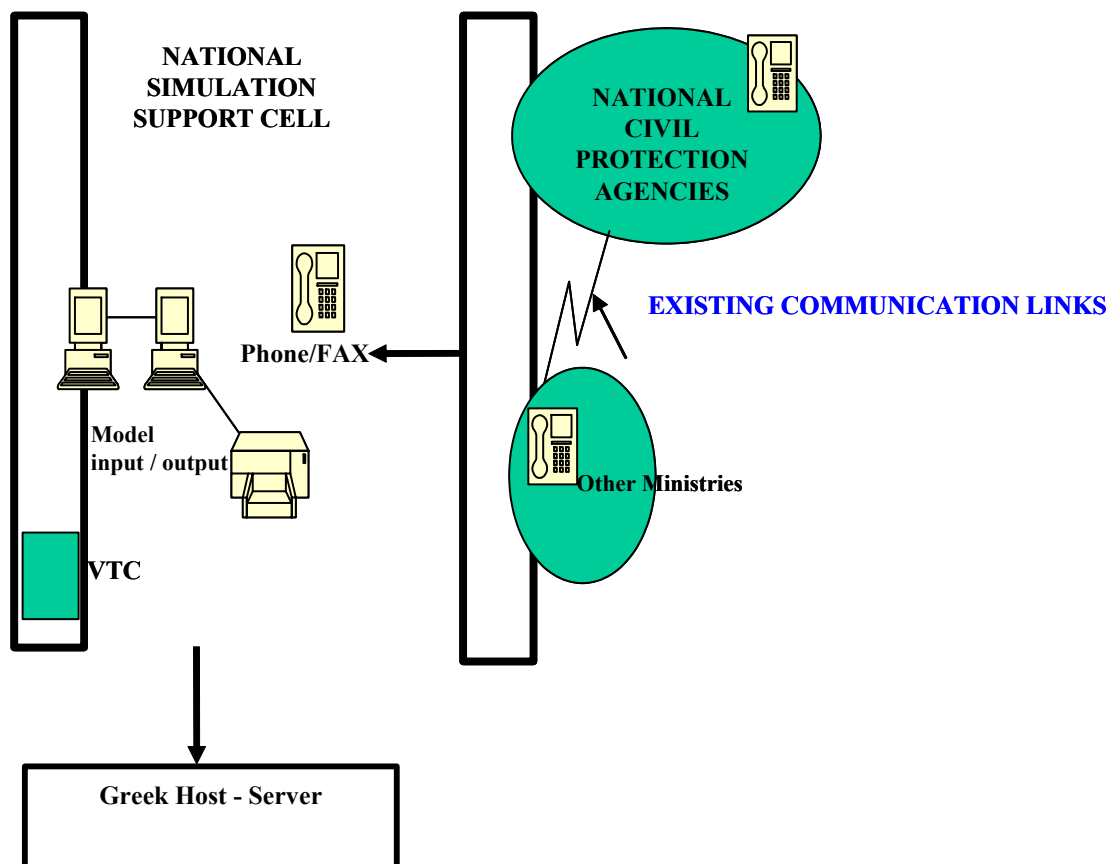
**Training objectives for SEDM countries are:**

- Exercise national civil-military emergency procedures.
- Exercise the staffs of Military and Civil Protection Agencies and other responding organizations.
- Exercise each SEDM nation's ability to plan and provide assistance to other nations in the region.
- Exercise emergency information exchange among nations with organizations such as EADRCC.
- Exercise existing communications available to the participating nations.
- Exercise the SEEBRIG Headquarters during regional emergency planning and response to natural disasters.
- Exercise existing commercial phones, fax, email, and the Partnership for Peace Information Management System (PIMS) available to national civil-military emergency organizations in South Eastern Europe.



### Proposed SEESIM Scenario Concept:

- Major earthquake damage in affected nations.
- There are two groups of affected nations. (Grouping determined by Operational WG-based on geological facts and bilateral CMEP agreements).
  - 3-day sessions for each affected nation group.
  - Other nations provide support as requested.
  - Affected nation and support nation roles rotate at end of session #1.
- Major roles for National Military and Civil Agencies, Euro Atlantic Disaster Response Coordination Center (EADRCC), NATO, UN, SEEBRIG/ETF, and Non-Governmental Organizations (NGOs).



### Creating Events:

- Using scenarios to represent key activities, which support training objectives.
- Master Scenario Events List (MSEL).
  - An activity or event that causes a decision or action by the training audience that allows the training objectives to be met.
  - Are pre-planned activities or events manually inserted or generated by JTLS.

### Potential military tasks:

- Provide a Secure Environment
  - For the affected population and relief agencies

- Transport
  - Arrange movement of life-saving goods and personnel via military aircraft, etc.
- Logistic Coordination
  - Warehousing, cargo handling, repairs, etc.
- Communications
  - Assist in unclassified communications
- Information Sharing
  - Security situation, planned movement, etc.
- Relief Distribution
- Exercise Support Manning
- SEEBRIG/ETF
  - Operations Coordination Center?
  - Cross-border movement coordination?
  - International logistics coordination?

**Exercise components:**

- Simulation Host Nation (Greece in 2002)
  - Runs Joint Theater Level Simulation (JTLS) and is linked to National Simulation Support Cells (NSSC) in all participating Nations.
  - Provides exercise feedback and ensures successful completion of demonstration and exercise through the multinational control group in Athens.
- National Simulation Support Cells (NSSC)
  - Two-way information link between the JTLS model in Athens and the National Civil Protection and Military Agencies.
- National Military and Civil Protection Agencies
  - Primary Training Audience.
  - Receive JTLS model information via National Simulation Support Cell (NSSC).
  - Use current real-world capabilities to deal with disaster response (Telephones, FAX, Email, Maps).

**Training audience:**

- Primary Training Audience:
  - National Military and Civil Protection Agencies
  - Other responding organizations in each nation (Red Cross etc.)
  - The South Eastern Europe Brigade (SEEBRIG) Headquarters
- Other Participants:
  - Euro-Atlantic Disaster Response Coordination Center (EADRCC)
  - NATO Civil Emergency Planning Directorate (CEPD)
  - UN Office for the Coordination of Humanitarian Affairs (OCHA)
  - Non-Governmental Organizations (NGOs)



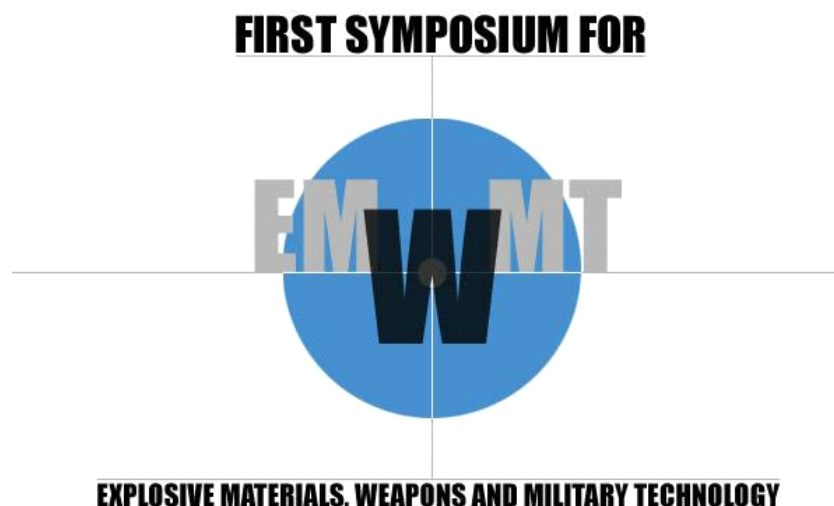
**Entities (resources) in the Simulation – JTLS Database:**

- Response units: personnel and equipment organized to provide capability in a disaster, for example:
  - Medical teams and hospitals
  - Search and Rescue teams
  - Helicopter units for transport, reconnaissance, evacuation
- Response Material: supplies and other items provided to assist victims of disasters, for example:
  - Tents
  - Blankets
  - Food
  - Water
  - Medical supplies

**THE FIRST SYMPOSIUM FOR EXPLOSIVE MATERIALS, WEAPONS AND MILITARY TECHNOLOGY**

The First Symposium for Explosive Materials, Weapons and Military Technology was held in Ohrid – a famous tourist, historical and cultural center by the beautiful Ohrid lake, in the Republic of Macedonia, on 25-28 September 2002. The Symposium was organized by the Military Academy “General Mihailo Apostolski”, and sponsored by the Ministry of Defense of Republic of Macedonia, in cooperation with the applicative production companies.

The Symposium was thematically focused on determined military – technological areas, military techniques and technology. The following topics were included: explosive materials, ballistics, ammunition, classic armament, rocket systems, systems for fire control, training simulators, composite materials, resources for ballistics defence, and standardization and the quality of the armament and military equipment.



**25-28 September 2002, Ohrid – Republic of Macedonia**

The main objective of the Symposium was to provide professional change of scientific-professional knowledge, information and experiences between the people and institutions in the region and in the

World, who deal with educative, scientific-research work, applicative and productive work, connected to the above mentioned areas.

The symposium had a special dimension in emphasizing the cooperation between the countries in the region and wider, through realization of mutual scientific – research projects. This kind of cooperation contributes in reaching the criteria and standards, important for NATO's membership.

For the Symposium, a lot of authors' works were applied from different countries in the region and in the world, such as: Bosnia and Herzegovina, Republic of Bulgaria, The German Federal Republic, Federal Republic of Yugoslavia, USA, Republic of Croatia and Republic of Macedonia. Representatives from Republic of Slovenia and Republic of Turkey also took part in the Symposium.

Some of the topics in the Symposium were closely connected with the field of modeling and simulation, and those are given as follows:

- *Missile systems* (unguided and guided missiles; rocket motors; light unguided anti-tank weapons; anti-tank guided weapons; surface-to-air and air-to-surface guided weapons; guidance and control systems; combat use of missile systems).
- *Fire control systems* (fire control systems for artillery and missile systems; sensors; detection, identification and acquisition of targets; ballistic computers and algorithms; automation of shooting process).
- *Simulators and training equipment* (modelling and simulations of projectiles and missiles; simulation and testing of guidance and control systems; hardware-in-the-loop simulations; simulators for research and training simulators).
- *Ballistics* (internal and external ballistics; terminal, wound and experimental ballistics; ballistics instrumentation, measurement methods and measurement in ballistics).

A lot of works presented in the Symposium were focused on the subjects like: simulation of automated data exchange in tactical units, modeling and optimization of fire-system combat effectiveness, computer simulations for the analysis of projectiles trajectory, simulation and analysis of fuzzy homing guidance systems of missiles, fuzzy-logic control of mobile robots, etc.

During the Symposium we exchanged our previous investigations and results with our colleagues, which are also Partnership for Peace members. Also, we considered that regional cooperation in this field is very important.

## **CONCLUSION**

The logic of the stabilization of the South East Europe requires a complex approach for achieving lasting peace, stability and security in the region. Promotion of transparency and mutual confidence in defence and security related issues are between the key tracks that lay at the basis of the regional military cooperation and partnership for peace.

Regional cooperation and common training using modeling and simulations would help nations to capitalise accumulated experience in addressing new security risks. Distance learning, together with modelling and simulations, will change the way armed forces are trained.

Good example of the regional cooperation in SEE is the SEESIM exercise designed as a tool to integrate – through a series of simulation-based exercises – various initiatives and information networks in the region sponsored, supported, or endorsed by SEDM.

The First Symposium for Explosive Materials, Weapons and Military Technology had a special dimension in indicating the cooperation between the countries in the region and wider, through realization of together scientific – research projects. A lot of the works presented in the Symposium were closely connected with the field of modeling and simulation. This kind of cooperation contributes in reaching the criteria and standards, important for NATO's membership.

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## SOUTH EASTERN EUROPE COOPERATION IN THE FIELD OF MODELING AND SIMULATION



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*RTA/MSG Conference, October, 2002, Paris*

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## ***Security Context in SEE***

- ▶ Countries in the South Eastern Europe (SEE) have to face a wide range of difficulties that are always associated with transitional periods
- ▶ The promotion of transparency and mutual confidence in defence and security related issues are between the key tracks that lay at the basis of the regional military cooperation and partnership for peace
- ▶ Southeast European Defense Ministerial (SEDM) process
- ▶ South East European Brigade (SEEBRIG)

## ***Security Context in SEE***

- ▶ Countries from the SEE make significant and systematic efforts to accomplish real progress in interoperability and full modernization of the existing system of military education and training
- ▶ Education and training are the shortest way to new military professionalism, interoperability and integration
- ▶ Long-range vision is to create distributed environment in which all nations have an equal opportunity to use, develop, deliver, and manage different kind of training and learning tools
- ▶ Common training would help nations to capitalise accumulated experience in addressing new security risks



## ***Implementation of M&S in military E&T promote interoperability with NATO***

- ▶ Interoperability towards NATO standards for conducting operations require basic education, training and exercising based on common procedures and standards
- ▶ Implementing M&S in military education and training will help every NATO aspirant country to make the necessary progress in the preparation for NATO integration
- ▶ With the combination of ADL and M&S through conducting CAX the following can be advanced:
  - ✓ General knowledge of NATO operational language
  - ✓ Basic knowledge of the generic NATO working environment
  - ✓ Specialized language terminology
  - ✓ Knowledge and practice of NATO staff procedures

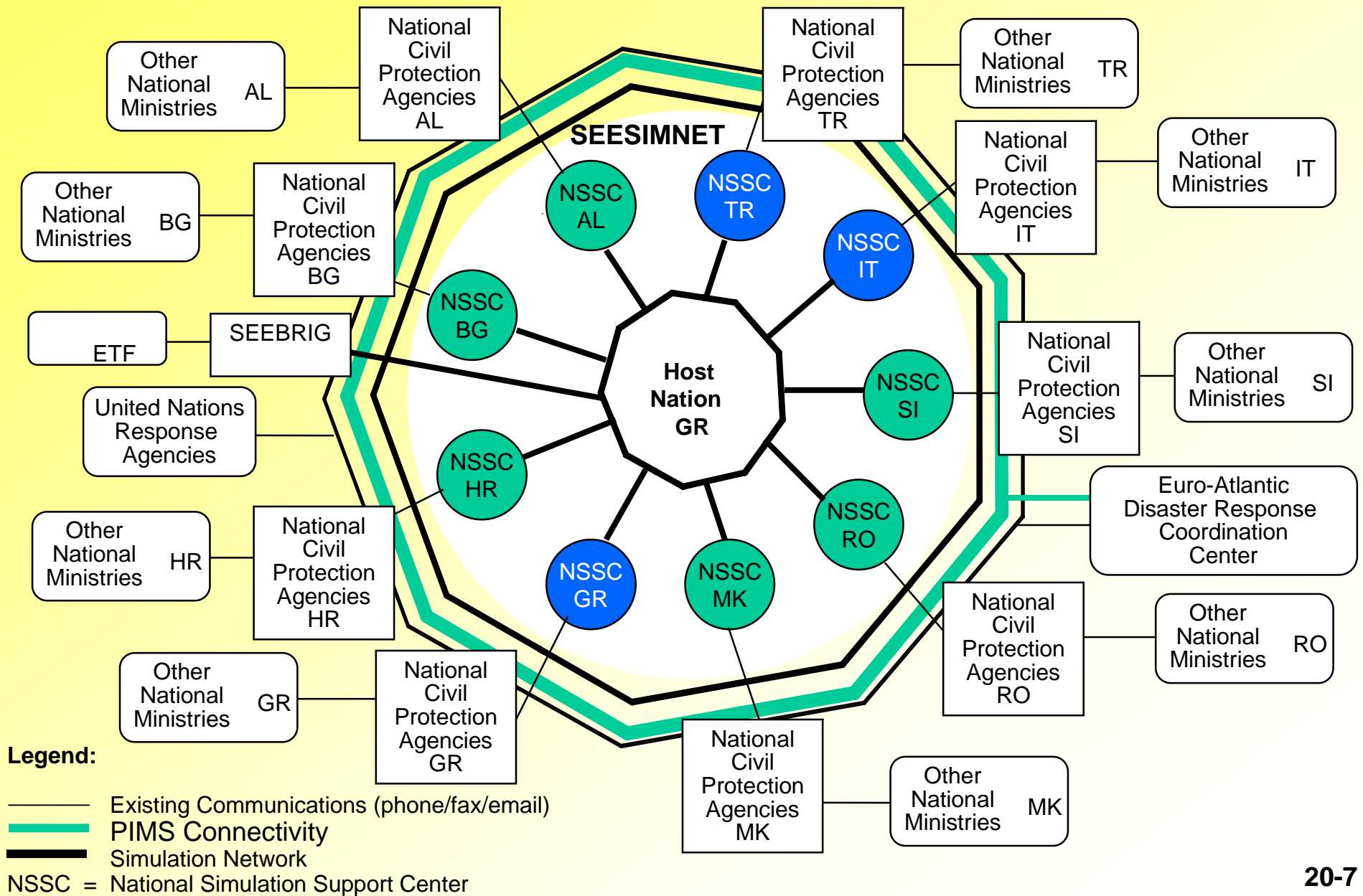
# ***SEESIM Exercise***

## ***Organization***

*Southeast Europe Simulation*



# Demonstration and Exercise Architecture



# Demonstration and Exercise Components

## In the Spirit of PfP

HUB AND SPOKE COMMUNICATIONS NETWORK

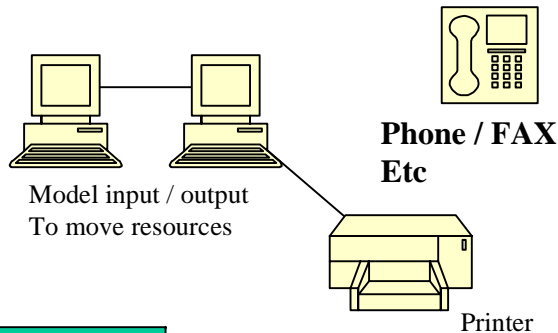
GREECE

**SIMULATION HOST  
AND  
DEMONSTRATION AND EXERCISE  
MULTINATIONAL CONTROL GROUP**

THE SIMULATION

**EACH  
NATION**

**NATIONAL  
SIMULATION SUPPORT  
CELL**



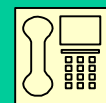
VTC

EXISTING COMMERCIAL  
COMMUNICATION  
LINES

**NATIONAL  
CIVIL  
PROTECTION  
AGENCIES**

Working from real  
world location(s)

EXISTING COMMUNICATION LINKS



Other  
National  
Ministries

CIVIL / MILITARY MENTOR

## *Training objectives for SEDM countries :*



- Exercise national civil-military emergency procedures
- Exercise the staffs of Military and Civil Protection Agencies and other responding organizations
- Exercise each SEDM nation's ability to plan and provide assistance to other nations in the region
- Exercise emergency information exchange among nations
- Exercise existing communications available to the participating nations
- Exercise the SEEBRIG Headquarters
- Exercise existing commercial phones, fax, email, and PIMS available to national civil-military emergency organizations in SEE

*Ohrid, Republic of Macedonia  
25 - 28 September 2002*



*For the Symposium, a lot of authors' works were applied from different countries in the region and in the world, such as: Bosnia and Herzegovina, Republic of Bulgaria, The German Federal Republic, Federal Republic of Yugoslavia, USA, Republic of Croatia and Republic of Macedonia. Representatives from Republic of Slovenia and Republic of Turkey also took part in the Symposium*

## ***First Symposium for EMWMT***

- ▶ The main objective of the Symposium was to provide professional exchange of scientific-professional knowledge, information and experiences between the people and institutions in the region
- ▶ The symposium had a special dimension in emphasizing the cooperation between the countries in the region and wider, through realization of mutual scientific - research projects
- ▶ Some of the topics in the Symposium were closely connected with the field of modeling and simulation:
  - ✓ ***Missile Systems***
  - ✓ ***Fire Control Systems***
  - ✓ ***Simulators and Training Equipment***
  - ✓ ***Ballistics***



## ***Conclusion***

- ▶ The logic of the stabilization of the South East Europe requires a complex approach for achieving lasting peace, stability and security in the region
- ▶ Regional cooperation and common training using modeling and simulations would help nations to capitalise accumulated experience in addressing new security risks
- ▶ Good example of the regional cooperation in SEE is the SEESIM exercise
- ▶ The First Symposium for Explosive Materials, Weapons and Military Technology had a special dimension in indicating the cooperation between the countries in the region, including the field of modeling and simulation.